EFFECTS OF IRRIGATION REGIMES AND CROP ROTATION ON BULK SOIL MASS

Komilov Komiljon Sobirovich

Associate Professor of Andijan Institute of Agriculture and Agrotechnologies https://doi.org/10.5281/zenodo.7954107

Abstract. This article presents the results of studies on the effects of short-row and crop rotation, deep tillage on soil bulk density between the rows of cotton. *Keywords:* cotton, experiment, cropping systems, irrigation, short-row.

Before studying the effects of short rotation cropping systems, irrigation regimes and different rates of mineral fertilizers on soil bulk density in field experiment 3, it was found to be 1.274 h/cm^3 in the 0-30 cm layer and 1.418 h/cm^3 in the 30-50 cm layer. (Table 1). This is considered optimal for the growth and development of any plant.

Table 1

Experiment 3 Volumetric mass and porosity of the soil at the beginning of the period of operation

Soil layer, cm	Density, g/cm ³		
0-10	1,242		
10-20	1,265		
20-30	1,315		
0-30	1,274		
30-40	1,361		
40-50	1,476		
30-50	1,418		
50-60	1,472		
60-70	1,463		
70-80	1,419		
80-90	1,415		
90-100	1,362		
40-100	40-100 1,435		
0-100	1,379		

It was observed that the volume mass of the soil was different according to the options under the influence of the applied factors towards the end of the cotton period. In the 70-70-60% irrigation regime of the short-row rotation 1:1, winter wheat: cotton system, when mineral fertilizers were applied at the rate of $N_{160}P_{112}K_{80}$ kg/ha, the volume mass of the soil in the 0-30 cm layer was 1,328 g/cm³, 30-50 cm layer was found to be 1.452 g/cm³. In this crop rotation system, when mineral fertilizers $N_{200}P_{140}K_{100}$ and $N_{240}P_{168}K_{120}$ kg/ha were applied, the volume mass of the soil in the 0-30 cm layer decreased by 0.003-0.007 h/cm³ compared to option 1. was noted that the volume mass of the soil was 0.006-0.013 h/cm³ in the 30-50 cm layer (Table 2).

In the 1:1 winter wheat: cotton system of short rotation, it was observed that the volume mass of the soil increased due to the increase of the irrigation regime when the irrigation regime was 70-75-65% compared to the irrigation regime of 70-70-60%. The volume mass of the soil in

SCIENCE AND INNOVATION INTERNATIONAL SCIENTIFIC JOURNAL VOLUME 2 ISSUE 5 MAY 2023 UIF-2022: 8.2 | ISSN: 2181-3337 | SCIENTISTS.UZ

the 0-30 cm layer in the 4-5-6 options with the irrigation mode of 70-75-65% compared to the 1-2-3 options with the irrigation mode of 70-70-60% is 0.021-0.022-0.024 g/ It was found that it increased compared to cm³. In the 1:1 winter wheat: cotton system of short-row rotation, the most positive volume mass of the soil was recorded in option 3 (1,321-1,439 g/cm³) where mineral fertilizers were applied at the rate of $N_{240}P_{168}K_{120}$ kg/ha in the regime of 70-70-60% irrigation.

Table 2

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Experiment 3 soil bulk density and porosity									
$ \begin{array}{ c c c c c c } \hline Var \\ no \\ n$		Short rotation	Irrigation pattern	Standards of		Volumetric				
$ \begin{array}{ c c c c c } \hline \mbox{noise} & \mbox{relation to} & \mbox{dused in cotton,} & \mbox{layer, cm} & \mbox{g/cm} &$	Var		of cotton in	mineral fertilizers	Soil					
$ \begin{array}{ c c c c c c c } \hline \begin{tabular}{ c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	no		relation to	used in cotton,	layer, cm	,				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		systems	BdFMC, %	kg/ha		g/cm3				
$ \begin{array}{ c c c c c c } \hline \\ \hline \\ 2 \\ \hline \\ 2 \\ \hline \\ 3 \\ \hline \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	1		70-70-60 %	N ₁₆₀ P ₁₁₂ K ₈₀	0-30	1,328				
2 30-50 1.446 3 1:1, winter wheat: cotton 1:1, winter wheat: cotton 0.30-50 1.439 4 N160 P168 K120 0.30 0.3143 5 0.30-50 1.439 6 N160 P112 K80 0.30 1.349 7 70-75-65 % N200 P140 K100 0.30 1.347 6 70-75-65 % N200 P140 K100 0.30 1.347 7 70-70-60 % N160 P112 K80 0.30 1.345 8 1:1, winter wheat+repeated crop soybean: cotton 70-70-60 % N160 P112 K80 0.30 1.322 10 1:1, winter wheat+repeated crop soybean: cotton 70-75-65 % N160 P112 K80 0.30 1.321 11 1:1, winter wheat+repeated crop soybean: cotton 70-75-65 % N160 P112 K80 0.30 1.344 13 1:1, winter wheat+repeated crop soybean+mixed siderate crops 70-70-60 % N160 P112 K80 0.30 1.339 14 0.50 1.443 0.50 1.443 13 1:1, winter wheat+repeated cro	1				30-50	1,452				
$ \begin{array}{ c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	2			N200 P140 K100	0-30	1,325				
3 1:1, winter N240 P168 K120 30-50 1.439 4 wheat: cotton N160 P112 K80 0-30 1.349 5 70-75-65 % N200 P140 K100 0-30 1.457 6 70-75-65 % N200 P140 K100 0-30 1.347 7 N240 P168 K120 0-30 1.452 7 N240 P168 K120 0-30 1.345 7 N240 P168 K120 0-30 1.323 7 N160 P112 K80 0-30 1.323 7 N160 P112 K80 0-30 1.323 9 1:1, winter 70-70-60 % N240 P168 K120 0-30 1.323 10 soybean: cotton 70-75-65 % N160 P112 K80 0-30 1.341 11 1:1, winter 70-75-65 % N160 P112 K80 0-30 1.341 12 1:1, winter 70-75-65 % N160 P112 K80 0-30 1.344 13 1:1, winter 70-75-65 % N160 P112 K80 0-30 1.314 14	2				30-50	1,446				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	3			N240 P168 K120	0-30	1,321				
$ \begin{array}{ c c c c c c } \hline 4 \\ \hline 5 \\ \hline 5 \\ \hline 6 \\ \hline \\ \hline \\ 6 \\ \hline \\ \hline \\ 6 \\ \hline \\ \hline \\$	5	1:1, winter			30-50	1,439				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	4	wheat: cotton			0-30	1,349				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	4			1N160 F 112 K80	30-50	1,457				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5		70 75 65 %	Ness Ders Kros	0-30	1,347				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5		70-75-05 %	1 N 200 F 140 K 100	30-50	1,452				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	6			Neve Deve Kees	0-30	1,345				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0			1 N 240 F 168 K 120	30-50	1,449				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	7			New Deer Kas	0-30	1,326				
$ \begin{array}{ c c c c c c c } \hline 8 \\ \hline 8 \\ \hline 9 \\ \hline 1:1, winter \\ wheat+repeated \\ \hline 10 \\ \hline 0 \\ soybean: cotton \\ \hline 11 \\ \hline 12 \\ \hline 12 \\ \hline 13 \\ \hline 14 \\ \hline 14 \\ \hline 15 \\ soybean+mixed \\ \hline 15 \\ \hline soybean + mixed \\ \hline 15 \\ \hline (oats, blue peas, \\ \hline (oats, blue peas, \\ \hline \end{array} \begin{array}{c} \hline 70-70-60 \ \% \\ \hline 70-70-60 \ \% \\ \hline 70-70-60 \ \% \\ \hline N_{200} \ P_{140} \ K_{100} \\ \hline N_{240} \ P_{168} \ K_{120} \\ \hline N_{200} \ P_{140} \ K_{100} \\ \hline \hline 30-50 \\ \hline 1,443 \\ \hline 0-30 \\ \hline 30-50 \\ \hline 1,450 \\ \hline 0-30 \\ \hline 1,319 \\ \hline 30-50 \\ \hline 1,436 \\ \hline 0-30 \\ \hline 1,319 \\ \hline 30-50 \\ \hline 1,431 \\ \hline \end{array} $	/		70-70-60 %	$N_{160} P_{112} K_{80}$	30-50	1,445				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0			N200 P140 K100	0-30	1,323				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	0				30-50	1,443				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	0			N240 P168 K120	0-30	1,320				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	9				30-50	1,443				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	10	crop	n N ₁₆₀ P ₁	N. D. K.	0-30	1,347				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	10	soybean: cotton		N160 P112 K80	30-50	1,456				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	11		70-75-65 %	N ₂₀₀ P ₁₄₀ K ₁₀₀	0-30	1,344				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	11				30-50	1,450				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	10	12		N240 P168 K120	0-30	1,339				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12				30-50	1,448				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	12			N ₁₆₀ P ₁₁₂ K ₈₀	0-30	1,319				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	13				30-50	1,436				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	14 crop	1	70-70-60 %	$N_{200} \; P_{140} \; K_{100}$	0-30	1,317				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		-			30-50	1,434				
(oats, blue peas, 30-50 1,431	15	•		N240 P168 K120	0-30	1,314				
	15	-			30-50	1,431				
16 rapesed):cotton 70.75.65 % N. D. K. 0-30 1,325	16		70-75-65 %	N ₁₆₀ P ₁₁₂ K ₈₀	0-30	1,325				
$\frac{16}{1000} 1000000000000000000000000000000000000$					30-50	1,445				

Experiment 3 soil bulk density and porosity

SCIENCE AND INNOVATION INTERNATIONAL SCIENTIFIC JOURNAL VOLUME 2 ISSUE 5 MAY 2023 UIF-2022: 8.2 | ISSN: 2181-3337 | SCIENTISTS.UZ

17			N200 P140 K100	0-30	1,322
		1N200 F 140 K100	30-50	1,442	
18		$N_{240} \ P_{168} \ K_{120}$	0-30	1,320	
			30-50	1,435	

When analyzing the data obtained from the field experiments, the volume mass of the soil in the options planted in the 1:1 short-row rotation, winter wheat-repeated crop soybean:cotton system compared to the options planted in the short-row rotation 1:1, winter wheat:cotton, the leguminous crop soybean and from it was found that it was better due to the amount of remaining root residues. 7-8 of the short repeated crop 1:1, winter wheat+repeated crop soybean: cotton, the irrigation regime was 70-70-60%, mineral fertilizers were applied at the rates of $N_{160}P_{112}K_{80}$ kg/ha, $N_{200}P_{140}K_{100}$ kg/ha and $N_{240}P_{168}K_{120}$ kg/ha. In options 9, 1:1 short-rotation, winter wheat:cotton system, mineral fertilizers $N_{160}P_{112}K_{80}$ kg/ha,

According to the results of field experiments, short-row rotation 1:1, winter wheat + repeated crop soybean: cotton system was used, 70-75-65% irrigation regime in 10-11-12 variants 0-30 according to the increase of mineral fertilizers. In the cm layer, the volume mass of the soil was 1,347-1,344-1,339 g/cm³, and in the 30-50 cm layer, the volume mass of the soil was 1,456-1,450-1,448 g/cm³, respectively. It was found that the best volume mass of soil in the agro background where this crop rotation system was used was option 12, and its volume mass was 1.339 g/cm³ in the 0-30 cm soil layer, and 1.448 g/cm³ in the 30-50 cm layer.

Analyzing the results obtained from the field experiments, 1:1 short rotation, winter wheat+repeated soybean+mixed intercrops (oats, green peas, rapeseed):cotton planted with 70-70-65% irrigation regime was used 13-14-15- it was noted that the volume mass of the soil was 0.009-0.008-0.007 g/cm³ less than the control options planted in the 1:1 winter wheat: cotton system, and 0.016-0.012-0.008 g/cm³ in the 30-50 cm layer. In this crop rotation system, in options 16-17-18, where the irrigation regime is increased to 70-75-65%, the 1:1 short-row rotation, winter wheat: cotton system is 0.003-0.003-0.003-0.003-0.001 g/cm³ and 0.024-0.025-0.025 g/cm³ were positive compared to 70-75-65% irrigation regime.

The results of the analysis carried out in the experiment showed that the volume mass of the soil by the end of the operation period achieved the best results in the short-row rotation 1:1, winter wheat + repeated crop soybean + mixed intermediate crops (oats, blue peas, rapeseed): cotton planted, 70- It was observed in option 15, which was irrigated in 70-65% irrigation mode, mineral fertilizers were applied at the rate of $N_{240}P_{168}K_{120}$ kg/ha. In this option, the volume mass of the soil was 1.314 g/cm³ in the 0-30 cm layer, and 1.431 g/cm³ in the 30-50 cm soil layer, and this indicator was at the beginning of the application period.1.274-1.418 g/cm³, and in the 1st option, which was calculated as control, it was 1.328-1.452 g/cm³.

REFERENCES

- 1. Abdalova G.N. Development of elements of cotton interrow operation and irrigation technology against leaching on typical gray soils: thesis-autograph written for obtaining the scientific degree of candidate of sciences. Tashkent: UzPITI. 2004. 21 p.
- 2. Avliyokulov A., Battalov A., Akhmedov J. Cultivation of Bukhara-6 variety // Agricultural journal of Uzbekistan. Tashkent, 2003. No. 5. 11 p.
- 3. Avliyokulov A., Ibragimov H., Akhmedov J. Agricultural measures of the Okdarya-6 variety // Agricultural journal of Uzbekistan. - Tashkent, 2003. - #6. - 10 b.

SCIENCE AND INNOVATION INTERNATIONAL SCIENTIFIC JOURNAL VOLUME 2 ISSUE 5 MAY 2023 UIF-2022: 8.2 | ISSN: 2181-3337 | SCIENTISTS.UZ

- 4. Avliyokulov A.I. Some features of the farming system in cotton farming // Scientific basis of development of cotton growing and grain growing in farms: Collection of international scientific-practical conference lectures. UzPITI. Tashkent, 2006. p. 214-238.
- 5. Egamov H., Rakhimov A., Tursunov I., Juraev A., Kholmurodjonov J., Resistance of varieties and lines of cotton to spider mites // "Modernization of the sphere of education and science taking into account world scientific and technological trends" collection of scientific papers based on international scientific and practical conference. -Belgorod: 2020. 12-14 p.
- Egamov H., Kimsanov I., Rakhimov A., Juraev A.N., Holmurodjonov. J., Issues of breeding methods and combination ability of cotton varieties // "Modernization of education and science, taking into account world scientific and technological trends" collection of scientific papers on materials of the international scientific-practical conference. -B 2020. 15-18 p.